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Single Molecule Studies of Chromatin

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Single Molecule Studies of Chromatin

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The DNA in eukaryotic cells is tightly packaged as chromatin through interactions with histone proteins to form nucleosomes. These nucleosomes are themselves packed together through interactions with linker histone and non-histone proteins. In order for processes such as DNA replication, DNA repair, and transcription to occur, the chromatin fiber must be remodeled such that the necessary enzymes can access the DNA. The structure of the chromatin fiber beyond the level of the single nucleosome and the structural changes which accompany the remodeling process are poorly understood. We are studying the structures and forces behind the remodeling process through the use of atomic force microscopy (AFM). This allows both high-resolution imaging of the chromatin, and manipulation of individual fibers. Pulling a single chromatin fiber apart using the AFM tip yields information on the forces which hold the structure together. We have isolated chromatin fibers from chicken erythrocytes and Chinese hamster ovary cell lines. AFM images of these fibers will be presented, along with preliminary data from the manipulation of these fibers using the AFM tip. The implications of these data for the structure of chromatin undergoing the remodeling process are discussed.

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